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## **CIFRA: Challenging the ICT Patent Framework for Responsible Innovation**

### **D4.2 Projection to other sectors beyond ICT**

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## PREFACE

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Social Sciences and Humanities (SSH) do not usually take a preeminent role in technical research projects. Sister projects arise as part of Horizon 2020 Framework Programme as a way to address this historical constraint and to allow SSH makes a meaningful contribution to the shaping of the research agenda. To this regard, Sister projects are created to go beside the mainstream research in order to challenge existing biases in the research agendas and trying out more daring alternatives through the widening of imaginaries and by taking into account the SSH perspective.

CIFRA, as a Sister project, does not take the current status quo in the ICT patent ecosystem for granted, but on the contrary, explores the impact that potential new framings could have in ICT innovation and the value they could provide to the society.

Moreover, CIFRA project has addressed the ICT Patent ecosystem from the perspective of the Responsible Research and Innovation (RRI), thus with the aim of determining the way it can be better aligned with the values, needs and expectations of society.

## 1 INTRODUCTION

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This document analyses the different vision of the problems and solutions identified specifically on the deliverables *D3.2\_Report on Assessment of Impact of proposed new Framings* for the patent system in other sectors beyond ICT. namely as the Health and Energy sectors. We have selected these two sectors because both have interesting Patent Systems that appeared to us attractive to make a comparison with our main focus, the ICT. Health, and in particular Pharmaceutical sector, is one when the number of patents is concentrated and Energy because it entails important indirect and emergent activities that could lead to a new environment with a new system of patents comparison among the perceptions of these sectors of the main issues concerning the Patent System and the findings on ICT sector obtained from the first survey ran as part of the WP3 of CIFRA project. That first survey (<https://inno.limequery.com/228186>) was implemented with the aim of defining and prioritizing the main elements of possible changes of the current IPR system for the ICT sector.

To carry out this specific comparison a second survey was launched, with the aim of comparing the different perceptions of innovation between the ICT and other sectors as Health or Energy. The survey was ran by email in two waves, a first launch in July 2017, in which not many responses were received, and then a second distribution between September and November 2017, obtaining a total of 14 responses, most of them from the health sector.

In the following table we present the level of responses.

**Table – 1 : KPI's Stakeholders**

<b>Indicator</b>	<b>KPI</b>
Total number persons contacted (ICT Vs Health sector survey)	42
Total persons answered (ICT Vs Health sector survey)	14
% of personas answered (ICT Vs Health sector survey)	30%

Among the different intellectual property rights, the CIFRA project chose to focus on patents because patents are particularly relevant in ICT. We acknowledge upfront that findings might not be generalizable to other IPRs or industrial contexts.

## 2 PROJECTION BEYOND ICT SECTORS

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### 2.1 INTRODUCTION

Based on the importance of patents for the promotion of responsible innovation and the awareness involved in the development and commercialization of patents and other intellectual property rights play we assert that patents in every sector play a different role.

The results obtained from the literature review of WP2, the insights of deliverable D3.1 and the results of expert interviews and the focus groups, captured in deliverable D3.2 allowed to the CIFRA consortium identify the most relevant problems and potential solutions of the patent system in the ICT sector. This part of the study will replicated the survey ran for the ICT sector for the health and the energy sector.

In the health R&D sector, the core scientific principles are to create technology and products aimed at treating diseases and the research progresses underlie functions of the human body. Treating diseases generally requires focusing on a specific biological mechanism, effectively limiting the number of substitute drugs. In this sector, even individual patents, may create a substantial impact, giving its owner a strong market position where it is granted.

By contrast, the technology approaches to address problems as climate change have long been off-patent and are already widely used. This happened because patents in the Energy Sector (Environmental Innovation) address efficiency and other incremental improvements of technology or features of existing solutions. Instead of unearthing entirely new approaches or technologies. For example, electricity generation by wind power was created in the late 19th century while the solar technology (photovoltaic) was discovered by the mid-20th century. Since then, both technologies' patents constitute incremental improvements over the fundamental technologies.

The level of competition in the energy technologies sector also differs dramatically from the pharmaceutical industry. In this latter industry the monopoly over a medicament may be exercised by a company owning a single patent. This is due to the fact that a single patent can protect a molecule, which may be the single active principle of a medicament, and which is not built on top of a previous innovation. In this case the level of competition is low, whenever other active principles have similar effect, or zero, whenever there is no reasonable alternative, and thus firms may have the market power to charge high prices for medicines or licensees. While, the patent ownership within clean energy technology segments themselves is generally distributed amongst numerous entities, each owning a subset of the technologies necessary to build an overall system, what limits the impact of each individual asset.

The objective of this study is to compare the results of the review of the issues and possible improvements related to current framework for ICT patents with the view of health and energy sectors. As no previous study has been found that tackles the different visions by different sectors on the problems and solutions for the patent system, this study is based on the responses to the two surveys run as part of the CIFRA project.

## 2.2 HEALTH SECTOR

It is known fact that patents are territorial rights and patent regimes are generally part of national technological and industrial strategies, but is also crucial to design them consistently with public health strategies. Patents over minor developments may be effectively used to discourage or block competition (e.g. generic producers, purchasing agencies and consumers), especially in developing countries, which generally lack the substantial technical and financial resources needed to challenge wrongly granted patents or to defend against infringement claims. It is very important for branded pharma companies to obtain patent protection for their products in order to garner the investments. Therefore, it is widely acknowledged that patents are a fundamental incentive to innovative activities in pharmaceuticals and biotechnology industry.

Patent protection for pharmaceutical products in the developing world can help to encourage the development of new medicines for diseases that affect these countries, by providing protection for the investments that need to be made by the pharmaceutical companies. Pharmaceutical companies often maintain that patent protection for drugs ensures that they are able to invest billions of dollars into the development of new products, by making sure that they will be able to take advantage of the sales. However, when the ideas that are being protected are medicinal drugs, this can be very controversial. Much of the controversy over pharmaceutical patents relate to the provision of drugs in the developing world.

As in an article in Forbes in June 2017<sup>1</sup> claimed the tension between the individual inventor and the population over what constitutes a reasonable length of protection for intellectual property has played out in countries around the world for centuries. Ultimately, however, a patent is not an intrinsic or Constitutional right, but a conscious choice by governing bodies to grant the exclusive ownership of rights to innovators based, as mentioned, on what's best for all of the citizens of the nation.

### Patents relating to pharmaceutical inventions

A patent claim relating to a pharmaceutical product may relate to an active ingredient as such independently of or jointly with formulations, salts, prodrugs, isomers, etc., or cover any of these subject matters separately. It may also solely cover a manufacturing process or include both a process and a product. In some countries, as noted below, use-related claims are admissible.

It is important to bear in mind that while the development of new molecules of pharmaceutical use may encompass various levels of inventive steps, pharmaceutical techniques for the preparation of medicines in different forms and dosages are generally well known and part of the pool of knowledge in possession of a 'person skilled in the art'. Hence, there is a narrow range of developments that could be considered genuinely inventive in this field in view of the state of the art.

### Patents relating to formulations and compositions

The same active ingredient may be presented in different dosage forms, for instance, as tablets, capsules, ointment or aqueous solutions for parenteral administration, which in turn can be formulated using different pharmaceutically acceptable excipients. A large number of patents claim

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<sup>1</sup> Dr. Robert Pearl is the bestselling author of "Mistreated: Why We Think We're Getting Good Health Care--And Why We're Usually Wrong" and a Stanford University professor.

formulations of new or existing drugs, often including specifications of dose or concentration, either as the principal claim or in subordination to claims over the active ingredients or their uses. 'Composition claims' cover active ingredients and pharmaceutically acceptable carriers or excipients, such as fillers, binders, disintegrates and lubricants. Finally, it should be noted that processes to prepare formulations or compositions are generally well known and routinely applied. Hence, claims over such processes would rarely be inventive.

## 2.3 ENERGY SECTOR

Innovation in energy technologies tries to address problems like climate change, renewable energy, and energy security. Energy technology is complex as on the ICT sector, companies may specialize in manufacturing one or several components, while others companies from other industries may try to adapt to their existing technologies to novel applications. For example, in the wind turbine technologies, patenting is concentrated on the use of improved materials and sensors that can allow longer product life-cycles and decreased system costs, while for the enzyme-based carbon the patenting is concentrated in obtaining better separation methods that can be traced to advances in the biotech industry.

In fact, the energy sector mix technologies from a diverse range of sectors of the economy which are employed in the extraction, conversion, and end-use of energy. Therefore, most energy innovations are not only developed by energy companies in the way that it is required a collaboration of other sectors in order to construct a specialized technology, such as: semiconductors (solar panels), electro-mechanical machinery (gas turbines), agriculture (biofuel feedstocks), and biochemistry (biofuel conversion technology). The role of patents in Renewable Energy Technology (RET) innovation still needs to be better understood. They can support the development of national policies and regulations, but this requires further clarification and understanding about the positive role they can play, the effectiveness of their use and the information they contain.

In the case of RET, further analysis is still required to assess the impact of patents on the innovation and commercialization rate of technologies. Renewable energy accounts for only a small proportion of total patenting activities. The characteristics of RET, notably the rate at which the market develops in comparison to the 20-year term of patents and the global activities of many equipment suppliers, mean that patents do not create a major barrier for the deployment of RET. Patents are a measure for research output. They can contain valuable information for the development of new technologies before a market takes off. However, there are some limitations to patent information. Licensing may be a better proxy for technology transfer and dissemination, yet information on licensing is often kept confidential. Different patent databases based on different classification schemes provide different results in searching. The users of patent information need to be informed of, and understand, these limitations. There are more than 200,000 patents in the area of renewable energy. Only in hindsight is it usually possible to identify which ones are key patents. Patenting in most renewable energy areas has increased more than five-fold in the last two decades. Many patents in solar PV and wind were filed 10-15 years ago and are reaching the end of their terms, unless they have not been abandoned or revoked in the countries where they applied. This means the information can soon be freely used, and may already be available for use in locations where patent protection was not sought. In any case the filings were usually limited to key markets, and very few renewable energy patents have been filed outside OECD countries and China. This means that patents in the renewable energy sector should be considered as a source of innovation for developing countries, not as a constraint to innovation.

Managing climate change requires driving technology with heavily investment for the private sector. In 2009 sixty percent of the total investment on clean energy technology R&D (29billions) was

privately financed (UNEP SEFI). Europe exhibits a higher dependence on industry investment, providing nearly seventy percent of the region's clean energy R&D funding (UNEP SEFI

Intellectual Property Rights (IPRs) are a key instrument for the energy private sector engagement which requires strong and predictable IPR protection as a pre-requisite to invest in low carbon and energy efficient technology.

Increasing patent quality will enhance the utility of patents as a source of technical information. Governments should ensure that applications examined by their patent offices are of the highest possible quality. Renewable energy patent information can provide valuable insights into: 1) which countries and innovators are active in inventing technologies, 2) which countries are the potential markets where technologies need to be protected, 3) the trends of technology developments in certain technology fields over time, 4) the trends of technology transfers from one country to another and 5) international research and co-operation as indicated by co-invention and co-ownership.

## 2.4 METHODOLOGY

The survey for the Health and the Energy sector has been structured by modifying the finale ICT stakeholder survey constructed on the **D.3.2 Report on Assessment of Impact of proposed new framing** of the CIFRA project.

The modifications were made as the following: first, we maintained the most generic questions related with the organization structured and the uses of the Intellectual Property Rights, in order to understand the level of R&D activity run in their companies and to measure how these sectors compete in terms of innovation.

Then we analyzed which challenges and problems can be of greater importance in sectors beyond ICT. So we followed the mayor proposals for the specifics changes on the current patent system presented. By only keeping the main points for granting effectiveness to promote innovation, challenges for the patent offices and the possible solution. We didn't take into account the questions which where specifics for the ICT sector, as the ones related with computer and software challenges.

Nevertheless, we kept the series of question provided to better understand how the sectors are implementing the Research, Responsible Innovation (RRI) regarding to the patents. In annex-1 we include the survey that was carried out.

Once we constructed the new survey, the distribution process was run by email between July and November. Where the target audience was power-technology companies for the Energy sector, while for the health sector were Pharma laboratories, research centers and companies. We sent in total 34 surveys.

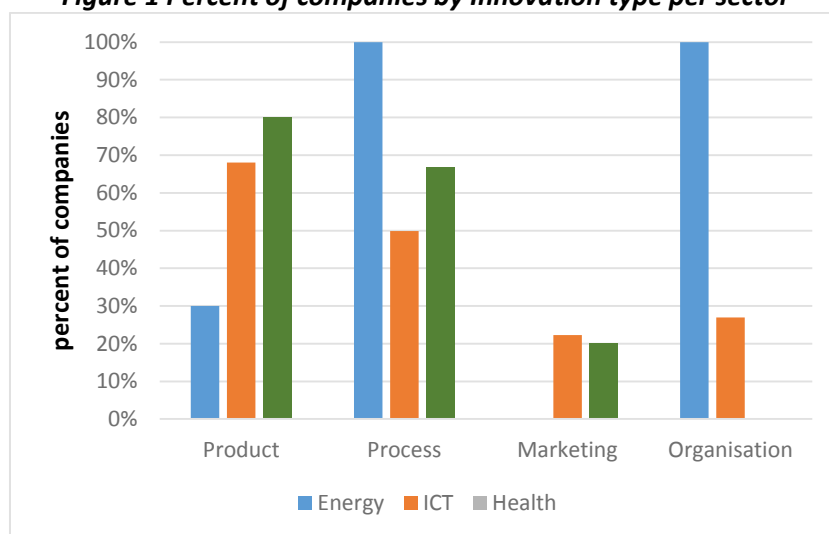
The main problem faced in this part of the project was the lack of responses by the stakeholders. On the first try to obtain answered surveys we couldn't reach the minimum expected. The total responses were three. Despite the fact that the low number of responses, we ran a second wave of emails to the previously contacted companies and adding 8 more recommended companies' contacts. Nevertheless, the result of this process was a total of 14 full answered surveys.

## 2.5 EMPIRICAL ANALYSIS

The main purpose of this deliverable is to assess the comparison among behaviors of different sectors related to patents. To better understand each sectors we compared the results obtained from the survey in *D3\_2\_Report on Assessment of Impact of proposed new Framings* with results obtained in the surveys of the health and energy sectors.

The Innovation activity across companies in the 3 sectors is based on the uses of Intellectual Property Rights (IPR). In the ICT and Health sector the large share of innovation (80% and 68% respectively) are concentrated in the introduction of new products to the market. While in the Energy sector the share is significant higher in the process and in the Organization innovation. Nevertheless, the three sectors are less interested to innovate in the marketing process.

**Figure 1 Percent of companies by Innovation type per sector**

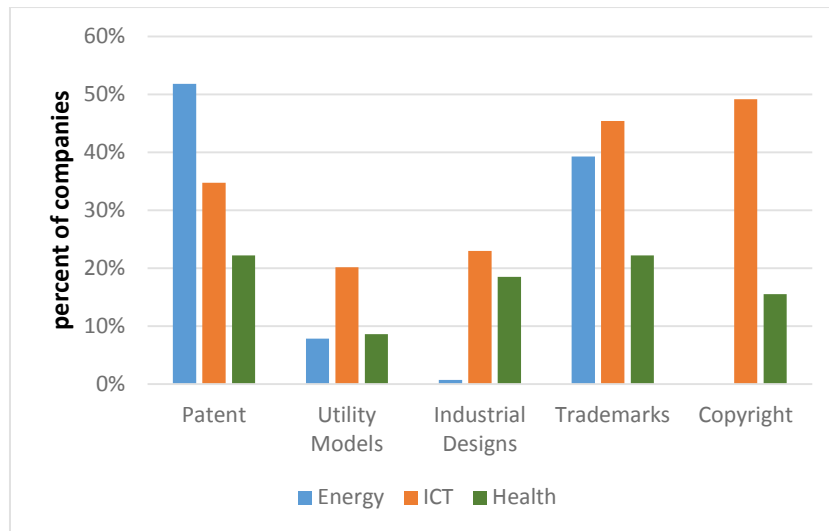


Source: own construction from survey responses

Analyzing the type of protection that each sector is willing to use for their intangibles, the energy sector, accounts by 50 percent of patenting activity, followed by the trademarks protection while obtain a utility model is less (>10%). Furthermore, their process innovation patents are anchored to address efficiency and other incremental improvements of technology more than to introduce products. Whereas, in the ICT sector the share for patent activity is even higher but it is also concentrated to registered trademarks and claimed copyright. On the other hand, in the health sector protect their innovation by patent is almost the same proportion than the uses of trademarks. This happened because the commercial success of brands has become a key driver of corporate strategy for pharmaceutical companies. The need for rigorous patent protection remains important and impulse by the spotlight is increasingly on trademarks.

**Figure 2 Percent of companies using Intellectual Property Right per sector**





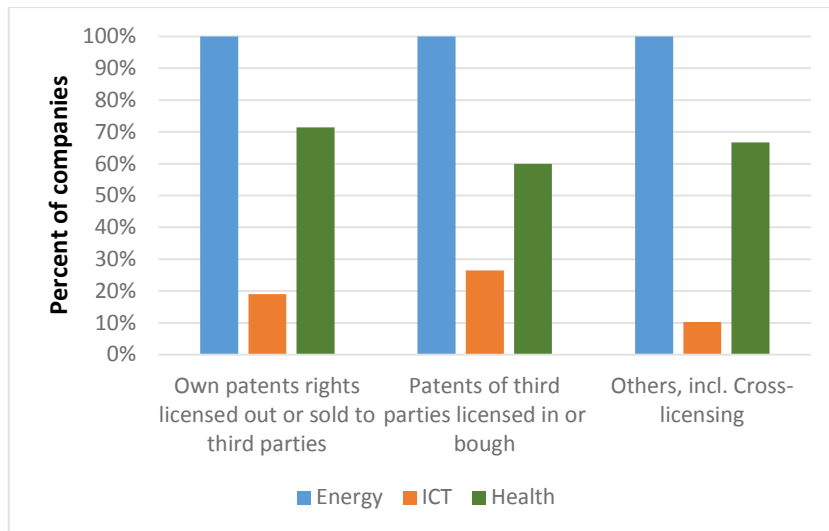
Source: own construction from survey responses

Taking into account the differences between each sectors, we analyzed the monetization strategies. The Health sector is characterised by having in many cases a univocal correspondence between a single patent and a product and by a dependency between the pharmaceutical, chemical and the biotechnology industries. These three industries are much different than other patenting industries such as computers and electronics (ICT) and Energy, these two sectors are characterized by extensive use of other techniques for managing inventions, including the use of trade secrecy and the pooling of patents with those of competitors to accommodate government and industry technical standards.

Nevertheless, we obtained more representative figures on the proportion of licensing patent. Licensing may be a better proxy for technology transfer and dissemination. In our sample we asked whether the patent-holding firms engaged in out-licensing at all to another companies or organizations in return of a reward or financial benefit. According to the survey responses the energy and health industries have a high rate of licensing out activity. Respectively 100% and 70% of the firms said in the survey that they currently do. The patented products of pharmaceutical companies can be easily and cheaply replicated by copiers with little capital investment, so patent exclusivity is the only effective way to protect and receive a return on that investment.

Conversely, by licensing – in the both sectors are able to increase the market penetration and be able to sell their services or products in other territories. Also to reduce the R&D cost and to save time in the introduction of new products on the high competition market concentration.

**Figure 3 Percent of companies willing to be part of the licensing activity per sector**



Source: own construction from survey responses

Perhaps the most striking finding is the ICT sector overall has the lowest values. This result may have variations because the proportion of number of surveys runs by sector (where the ICT has the largest number of responses).

### 2.5.1 Effectiveness of patents

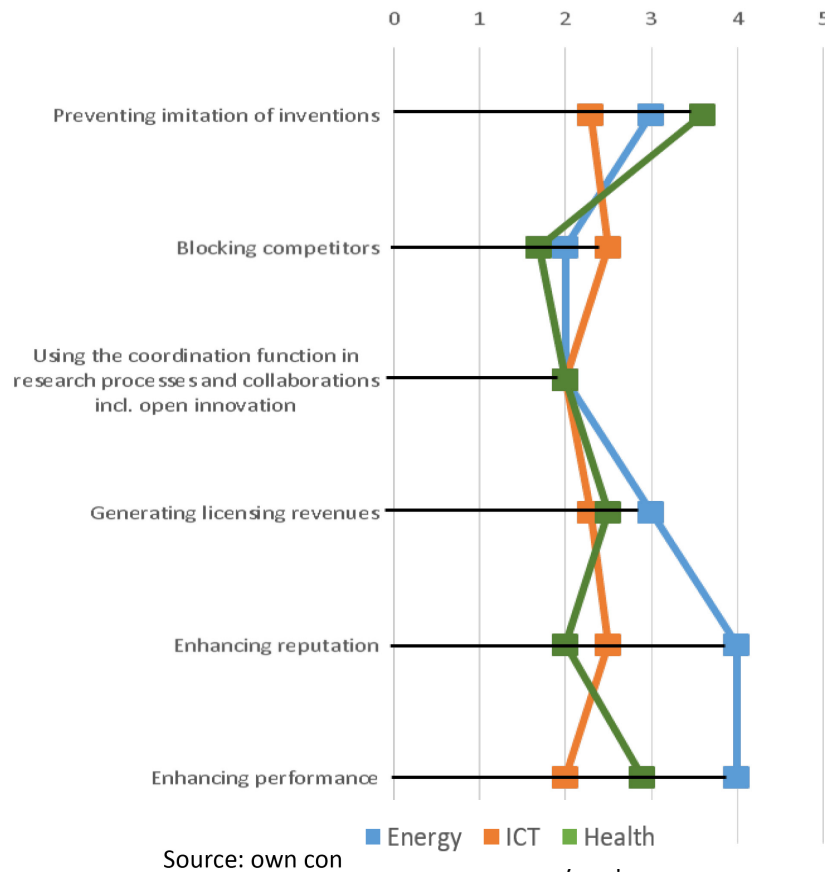
After understanding how the companies in the three sectors protect their innovation and monetized them, we established a reference point in order to be able to assess the problems identified in the patent system, is to compare the effectiveness of patents in their companies.

The differentiation of the responses depends on a company's business model. Overall, the importance of protection from imitation of invention achieves is higher for the energy and health sectors than the ICT, as we explained before, patented of pharmaceutical companies can be easily and cheaply replicated with little capital investment. Nevertheless, effectiveness of patents in blocking competitors is small for the health companies, due to this sector is willing to license more. By contrast the aggressive patenting strategy to block new developments and protect its strong market position it's been growing for the ICT sector. Maybe due to the accelerated grow up of the number of patents in the last decade.

The licensing generates revenues via patents are ranked lowest for the health sector despite there is the sector with highest rate of licensing. In the other hand, the ICT and the energy sector find effectiveness to license to obtain revenues.

However, using patents to enhance the own reputation and to measure performance is ranked the highest for the energy sector, while are above medium effectiveness for the other two sectors. Which also is aligned with the finding of Blind et al. (2011) of using patents for signaling own technological competencies.

**Figure 4 Effectiveness of patents ranging from very low (1) to very high (5)**



### 2.5.2 Challenges for patents

Some of the most relevant problems and potential solutions identified in the literature were presented in Deliverable D3.2. Based on those results we compare with other sectors experiences.

The three sectors have the same perception of costs for applying patents. For them is not a problem invest in protect their innovation, large companies have resources reserved for these expenses. Furthermore, the granting process for Energy and ICT patents are obviously more complex due to the technological dynamics while for the health sector this is not an issue as long as they can have the patent.

The requirement of collaboration between sectors to construct a specialized technology, increase the dependency of ICT technology (energy and health sector especially). So, the large quantity of patents application on the ICT generated challenges on evaluated the quality of those patents. Nevertheless, the current state of the art is more difficult to identify due to the dynamic ICT technologies. On the other hand, in the health sector is more difficult to grant a low quality patents because getting a primary patent in this sector is more complex, since almost all the products are for patients and have to be tested before they are released on the market. Nevertheless, by strategy pharmaceutical firms tended to using secondary patents to extend periods of exclusivity. This was generating concerns among policymakers worldwide due to the fact that were doubts of the quality of those patents. In response, some developing countries have introduced measures to curb the grant the secondary patents.

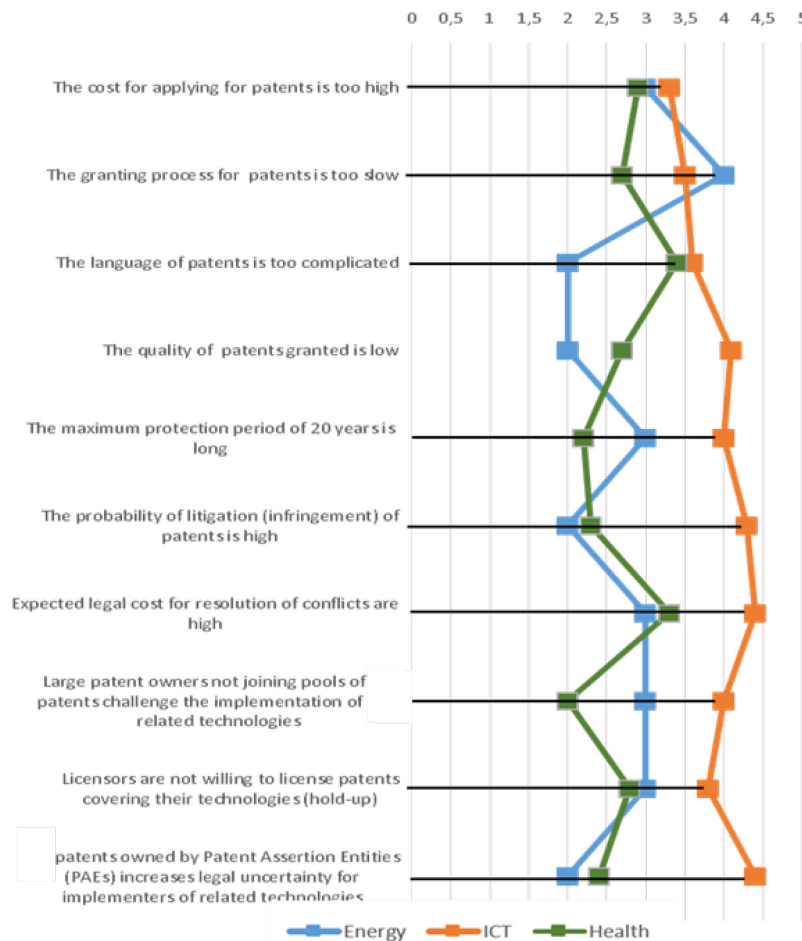
The assessment of the adequate length of the protection period for patents reveals that the current maximum length of twenty years for the Health sector is appropriate even if in the pharmaceutical industry emphasizes very early disclosure of inventions, usually long before a resulting product can be placed on the market. In fact the pharmaceutical sector as we explained before relies on secondary patents to extend the periods of protection. In the other hand in the other two sectors inventions can be kept like trade secret until the moment they are marketed, this option enables the companies to delay the patent filings until the last possible moment and maximize the effect of the 20 year patent term

Another important fact, is that, unlike sectors as energy or ICT, the health sector is heavily regulated by government agencies to assure the safety and efficacy of products which will be sold to consumers. Nevertheless, the investment in new drugs needs to pass some the clinical trials which are necessary to satisfy safety and efficacy regulators.

Another challenge can be the language used for health and ICT patents is perceived problematic. In both sector the tendency to keep the claims as generic as possible is higher.

The challenges in terms of litigation and Patent Assertion Entities (PAE) are related. While the PAEs, are divided in good ones fostering licensing for the re-appropriation of R&D investments and bad ones using the cost of litigations to push the price for licenses. In several interviewees we confirm an increase interest in the litigation activity driven by the phenomenon of overlapping claims. Nevertheless, are still much more relevant in the ICT sector than in the energy and health sectors have less.

***Figure 5 Assessment of the challenges for patents regarding patent enforcement and application ranging from totally disagree (1) to totally agree (5) (patent owners (yes) vs non-patent owners (no))***



Source: own construction from survey responses

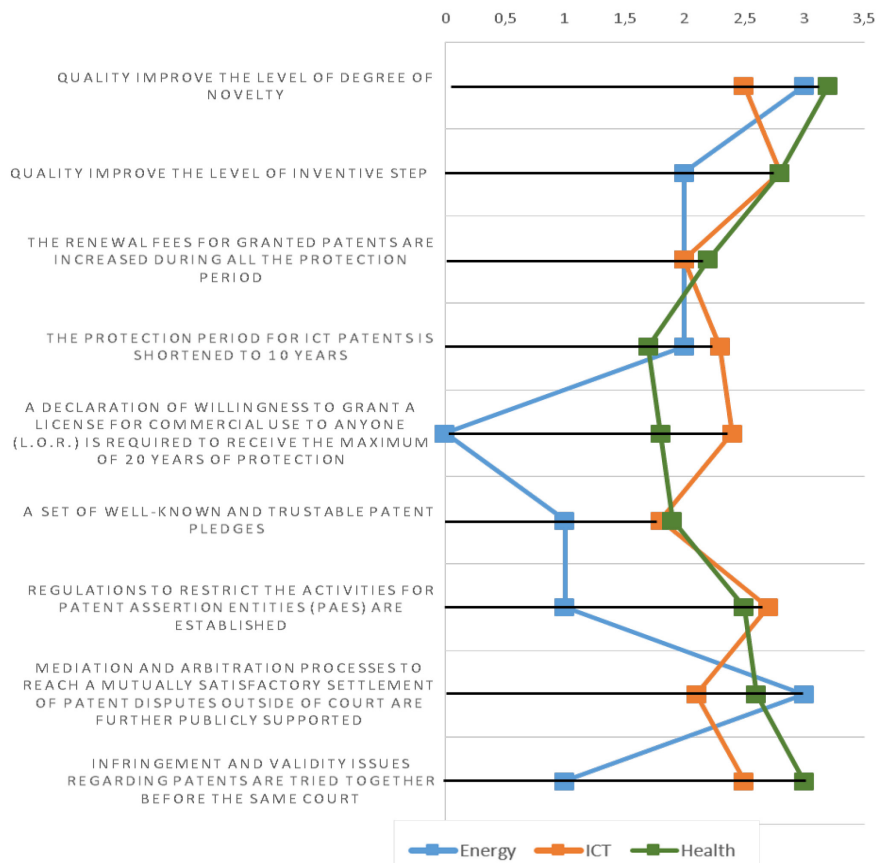
### 2.5.3 Solutions

We developed a set of possible solutions focus on the success of patent application and the enforcement and implementation of patents.

The effectivity in the successful of patent application is focus on: *raising the quality of patents*. Indeed, the patents system should have appropriate policies and examination procedures to harmonized approach to high-quality patents. Also, the three sectors have the same perception on *raising the costs for patent applications or renewals* of granted patents are not perceived to be very effective. According to some interviewees, higher application fees would distract patents of low quality. Furthermore, this instrument will not being effective in raising patent quality. It is clear that the above changes will provide efficiencies for the patents offices, not only in terms of cost but on a broader, practical level.

In terms of halving the patent protection period the majority of interviews see no need to restrict the protection period despite the high dynamics in ICT and energy sector.

**Figure 6 Assessment of solutions for patents promoting innovation regarding patent application and granting ranging from not effective (1) to very effective (4)**



Source: own construction from survey responses

However, we analyzed solutions focus on facilitating the licensing of patents. And the proposals to solve conflicts both within and outside courts easier.

The health and ICT sector have the same perception in the activity of licensing the rights through patent pledges and regulation to restrict PAEs, not only as institutions and as part of the system to increase market transparency and efficiency, but also a source to generate revenues for financing R&D. Another interesting instrument is the declaration of willingness to grant a license for commercial use to anyone (L.O.R.) because it is proposed to reward companies by reducing the maintenance fees, especially for older patents, and by expanding the patent protection period.

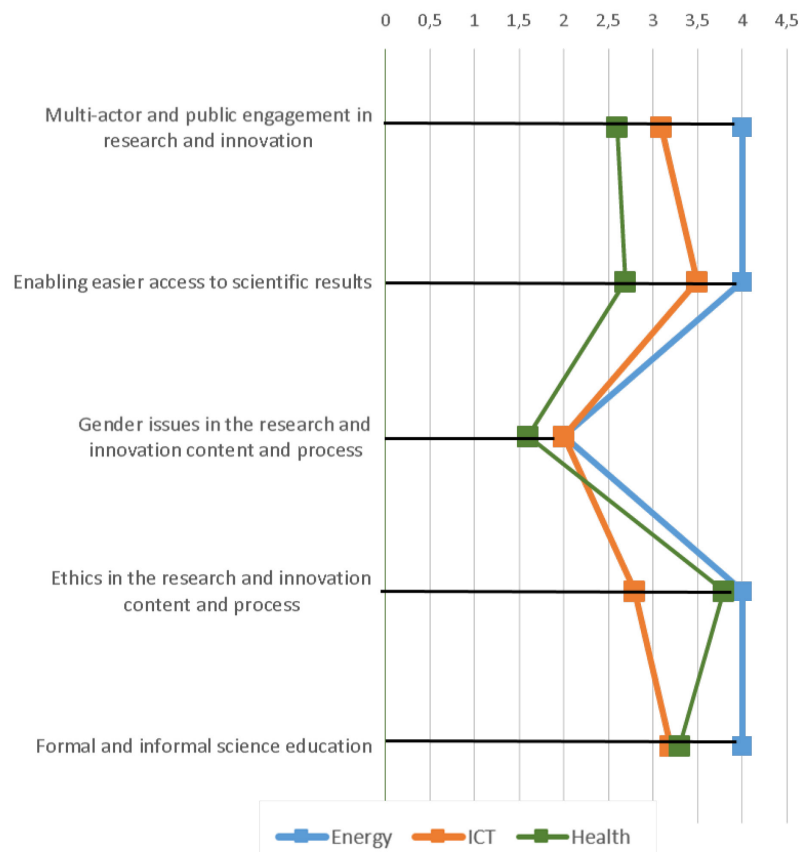
The proposed solutions related to patents disputes in specialized courts in order to deal only with patent disputes including both questions of patent validity and infringement are higher for the health sector than the others.

#### 2.5.4 Assessment of RRI dimensions

According to the European Commission, “Responsible research and innovation (RRI) is an approach that anticipates and assesses potential implications and societal expectations with regard to

research and innovation, with the aim to foster the design of inclusive and sustainable research and innovation.”

**Figure 7 The use of Intellectual Property Right by sector**



Source: own construction from survey responses

We first asked about the importance of the multi-actors and public engagement, which, in general terms, implies the ways to engage the society broadly in the research and innovation activity. The answers in the three sector are scattered. In one hand, the innovation in the energy sector currently is focus in ensuring the operations by carrying out an environmentally responsible manner. furthermore, the public support to reduce the global warming emission of greenhouse gases allows to achieve sustainability targets by funding incentives.

As we can see form the figure, Energy sector considers that all issues to encourage the use of Intellectual Property Rights are highly important with respect ICT or health sectors. With the exception of gender, that all agree on low effect, ICT and Energy sectors would like to enable higher access to scientific results and a major presence of other actors in the implementation of R&D.

To ensure basic human rights are respected, that products will be developed in accordance with trade principles that are fair and that recognise the rights of people to just reward (including labour rights and intellectual property rights) and that costs and benefits are equitably distributed. We analyzed the importance of the ethical considerations. The health and energy plays more important role that in ICT. Nevertheless, to benefit the society and human wellbeing the healthcare industry applies life- enhancing products such a medicines and equipments. Also the ways that the companies are testing the innovations in this sector has been controled since decades ago. However, since the techonology is allowing them to improve processes, now there is a new concern in the society bases

on the personal information (data protection). The energy sector, also has a huge government incentives to support and improve the environmental innovation (green transport, waste minimalization, improve efficiency). According to our findings, the three sectors are aware of the importance of training their employees in the RRI dimensions and to create projects more focused in RRI. Perhaps the societal challenge generated by emerging technologies is higher for the energy and ICT sector, whilst the health sector and the pharmaceutical industry have more experience in dealing with the improvement of societal welfare.

## 2.6 CONCLUSIONS

This report aims at identifying the different perspectives and opinions beyond the ICT sector about the current challenges and proposed solution for patents system presented in CIFRA's deliverable D3.2, based on the insights of the literature review and the empirical analysis performed in Work Package 2.

The only problems identified as highly relevant by all three sectors are: the slow process to obtain a patent grant and the lack of willingness to license some patents. Thus, the perception of other problems such as patent quality, the patent protection period and litigation are different for each of the sectors. Taking into account the identified problems, we have assessed the appropriateness of some of the solutions. In this case, the three sectors agree in the importance of the Patent Offices in the process of ensuring the level of quality of the innovation, the increase on the maintenance fees in order to promote innovation and reduce low quality patents.

The short number of responses received from the Health and Energy sector, made it challenging to compare the results with the ICT sector. Nevertheless, we have identified some clear particularities for the different sectors. We can conclude that patents play a key role as an engine for innovation and as a source of information regarding innovation trends in R&D intensive sectors, such as pharmaceuticals. Making patent information more accessible may help to accelerate innovation. Patent information can be made more accessible and easy to understand, for example through translations and a user-friendly information platform.



## References

- Chandra Mohan SB, SB Puranik, Prasanna Sagar, Swamy Sreenivasa4, and Madhu Chakrapani Rao. 2014. Patents - An Important Tool for Pharmaceutical Industry. Journal of Pharmaceutics and Nanotechnology,
- Pearl, Robert. 2017. Why Patent Protection In The Drug Industry Is Out Of Control. Forbes.
- UNEP, SEFI and New Energy Finance. "Global trends in Sustainable Energy Investment 2010." 2010. (UNEP SEFI), pg. 25 based on Figure 20. Another source estimates clean energy R&D spending closer to \$20 billion (USD).
- Europe's private sector contributed \$8.1 billion (USD) of \$11.6 billion (USD) spent on clean energy R&D in 2009. UNEP SEFI, pg. 26.

## ANNEX-1: Survey per the health and energy sector

### Contact data:

Please give us some information (confidentiality is guaranteed), which allow us to send you the summary of the results.

mail address	
Company Name	
Country	

### 0. Position of the person answering the questionnaire

Please indicate your position or responsibility in your company	
Chief Executive Officer (top management)	<input type="checkbox"/>
Member of Legal/Patent Department	<input type="checkbox"/>
Member of R&D Department	<input type="checkbox"/>
Other position	<input type="checkbox"/>

Please specify: \_\_\_\_\_

### 1. Basic economic information about your company

What is your company's core business or primary sector of activity?

--

What is your company's core business model?

Business model of your company (multiple answers possible)	
Company producing final consumer products	<input type="checkbox"/>
Company supplying components	<input type="checkbox"/>
Research institute (Private)	<input type="checkbox"/>
Research institute (Semi-Public)	<input type="checkbox"/>
Service company	<input type="checkbox"/>
Other business model:	<input type="checkbox"/>

### 2. Innovation Activity

During the 2014-2016 period, your company introduced any type of innovation, that is, a product, service, process (technology), marketing or organizational method, which is new or significantly improved?

Tipo de innovación	No	Si
Innovación de producto	<input type="checkbox"/>	<input type="checkbox"/>
Proceso de innovación	<input type="checkbox"/>	<input type="checkbox"/>
Innovación en marketing	<input type="checkbox"/>	<input type="checkbox"/>
Innovación organizacional	<input type="checkbox"/>	<input type="checkbox"/>

### 3. Use of Intellectual Property Rights

Did your company make use of the following intellectual property rights between 2014 and 2016 and if so, please provide an approximate number?

Intellectual Property Rights	No	Yes	Approx. Number
Application of Patents	<input type="checkbox"/>	<input type="checkbox"/>	
Application of Utility Patents	<input type="checkbox"/>	<input type="checkbox"/>	
Registration of Industrial Designs	<input type="checkbox"/>	<input type="checkbox"/>	
Registration of Trademarks	<input type="checkbox"/>	<input type="checkbox"/>	
Enforcement of Copyrights	<input type="checkbox"/>	<input type="checkbox"/>	
Others	<input type="checkbox"/>	<input type="checkbox"/>	

Did your company license out or sell own patents or license in patents of third parties?

Licensing	No	Yes	Approx. Number
Own patents rights licensed out or sold to third parties	<input type="checkbox"/>	<input type="checkbox"/>	
Patents of third parties licensed in /bought (excl. standard software)	<input type="checkbox"/>	<input type="checkbox"/>	
Others	<input type="checkbox"/>	<input type="checkbox"/>	

#### 4. Factors hampering innovation

Your activities to develop and introduce innovations into the market could be hampered by various factors. Please grade the importance of the following hampering factors for your company during the period 2014-2016.

Hampering factors	Importance				
	very low	low	medium	high	very high
Perceived excessive economic risks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Innovation costs too high	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Not feasible from a scientific/technical point of view	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of appropriate sources of financing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Internal rigidities within the company	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of information on technology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of information on markets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Governmental regulations (i.e. directives, laws)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Problems with access to intellectual property rights of other companies/organisations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Others, please specify: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

#### 5. Assessing the effectiveness of patents from your company's perspective

Please assess the effectiveness of patents for achieving the following objectives to apply patents.

Objectives	Assessment of effectiveness					No assessment
	Very low	Low	Medium	High	Very high	
Preventing unintended copying of inventions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Blocking competitors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Using in negotiations (incl. cross licensing)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Generating licensing revenues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Enhancing reputation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Measuring performance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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## 6. Assessment of the challenges for patents related to innovation in your company

Please assess the following challenges for patents in relation to innovation including research and development.

Challenges for innovation	Assessment					No assessment
	totally disagree	disagree	ambivalent	agree	totally agree	
The cost for applying for patents is too high	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The granting process for patents is too slow	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The language of patents is too complicated to qualify as a good source of knowledge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The quality of patents granted by the European Patent Office is low	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The maximum protection period of 20 years is long for patents	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The likelihood of litigation (infringement) of patents is high	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Expected legal cost for settlements of conflicts related to patents at court are high	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Licensors are not willing to license patents covering their inventions (hold-up)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Large patent owners not joining pools of patents challenges the implementation of technology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The use of patents by Patent Assertion Entities (PAEs) challenges innovation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## 7. Assessment of solutions to patents

Several solutions are currently being discussed to improve the present framework relevant for patents. Which of the following approaches are suitable to make the framework for patents more conducive to innovation?

Possible solutions	Effectiveness for innovation				
	not effective	ambivalent	effective	very effective	cannot be assessed
The application fees for patents are raised	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The quality of granted patents is improved by raising the required degree of novelty	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The quality of granted patents is improved by raising the required inventive step	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The renewal fees for granted patents are increased	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The protection period for patents is shortened to 10 years	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The declaration of willingness to grant a licence to anyone (licence of right L.O.R.) is required to receive the maximum of 20 year of patent protection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Defining a set of well-known and trustable patent pledges, i.e. voluntary commitments by patent holders to give up some of the rights associated to the patent (e.g. grant permission to use without any direct compensation, no injunctions, FRAND, etc)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Regulations to restrict the activities for Patent Assertion Entities (PAEs) are established	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mediation and arbitration processes to reach a mutually satisfactory settlement of patent disputes outside of court are further publicly supported (or mandatory?)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Special courts instead of general courts should deal with patent disputes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### 8. Assessment of RRI dimensions related to patents

Please specify the five dimensions of implementing Responsible Research and Innovation (RRI) and assess their relevance of related to patents.

RRI Dimensions	Relevance					cannot be assessed
	Very low	Low	Medium	High	Very high	
Multi-actor and public engagement in research and innovation:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Enabling easier access to scientific results:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Gender issues the research and innovation content and process:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ethics in the research and innovation content and process:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Formal and informal science education:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>